Universal Audio Apollo Twin

Small Things Make a Big Difference

By
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(United States)

One-knob boxes have become a common sight in musical instrument (MI) and semi-professional circles. Usually, these are simplistic products built to appeal to a less than discriminating consumer. Universal Audio, long known for its high-quality outboard gear, has adopted the "Big Knob"-on-a-sled form factor, while providing the new Apollo Twin family with features and sonics that are missing from the competition. This is not just another pretty (inter)face.

The rugged and compact Universal Audio Apollo Twin cabinet is dominated by a large, centrally located knob. The knob is augmented by a range of clearly labeled soft switches and visual mode annunciators. Two models—the Apollo Twin SOLO and the Apollo Twin DUO—are available. The name indicates the number of Analog Devices' fourth-generation SHARC processors—the ADSP-21469KBCZ4-02—that are available for on-board processing.

Apollo Twin Hardware

The Apollo Twin family consists of two input and six output desktop audio interfaces with up to 24-bit/192-kHz audio conversion. As with all Apollo hardware, real-time accelerated processing is available for tracking through UAD Powered Plug-Ins with very low latency. In a bold move, Universal Audio has chosen to only use Thunderbolt as its host bus attachment, for exceptional throughput and satisfyingly solid performance on modern desktop and portable Macs.

The two inputs can be switched between the line and the microphone, with Unison technology offering true hardware emulation for the digitally controlled microphone preamps. Two line outputs and two digitally controlled, independently addressable analog monitor outputs are also included, as is a front panel Hi-Z 0.25" unbalanced input and an independently addressable headphone output. Up to eight channels of additional digital input are available via a standard ADAT F05 connector. The

plastic optical fiber connection also supports S/PDIF optical with sample rate conversion when needed for operation at 4x sample rates. UAD Powered Plug-Ins, in AU, AAX64, VST, and RTAS are included for use in our favorite digital audio workstation (DAW) and the 64-bit device drivers support Peripheral Component Interconnect Express (PCIe) audio protocols.

DSP is used for all UAD Powered Plug-Ins. Universal Audio's Technical Marketing Manager Gannon Kashiwa explained that, "All our plug-ins run on our DSPs. That includes plug-ins instantiated in our DAW. The DAW sends the audio to us (the Apollo hardware) for processing, but…(the DAW thinks) we're native to their platform."

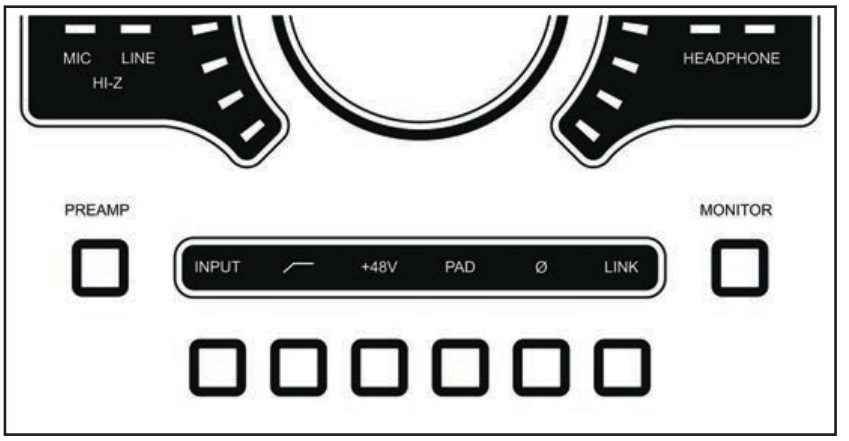
Another unique feature of the Apollo line, the Unison technology, replicates the behavior of physical microphone preamplifiers. "The impedance and gain staging are the physical components that are automatically changed when you insert a Unison-enabled preamp plug-in," Kashiwa said. This means that a microphone "sees" the actual load that corresponds to the hardware model that the plug-in represents. Other parameters—including a high-pass filter, a pad, and a polarity invert—can also be controlled by either the plug-in interface or on the Apollo hardware itself.

The centrally placed "Level Knob & Switch" (aka the Big Knob) controls multiple functions. The knob's function is selected with either of the flanking Preamp or Monitor buttons. When Monitor is selected, pressing the knob mutes or unmutes the monitor outputs. When Preamp is selected, pressing the knob alternates between Channel 1 and Channel 2. For both roles, twisting the knob provides gain adjustment.

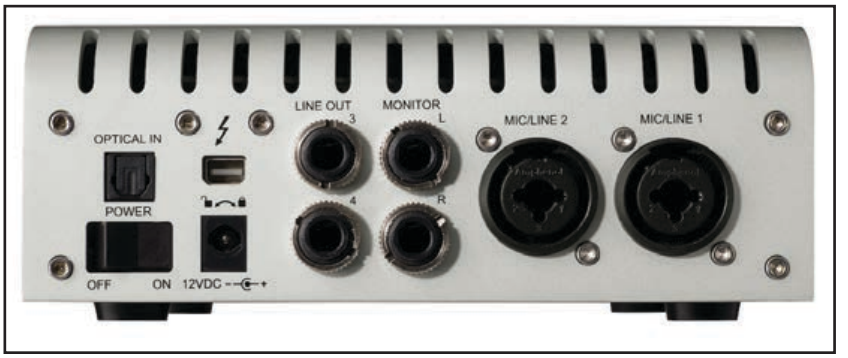
Below the Big Knob are six latching soft buttons. The Input Select alternates between the microphone and the line inputs, with the current selection displayed to the left of the Big Knob. The Hi-Z input is selected automatically whenever a mono 0.25" plug is inserted into the front panel's instrument jack. That input is hard wired to show up on Channel 1. The low-cut filter is a second-order high-pass filter, with a 75-Hz resonant frequency. The third button engages phantom power for the selected input, while the pad provides 20 dB of attenuation only for the microphone preamps. The Link button groups Input 1 and Input 2 so both channels are simultaneously adjusted as a stereo pair.

Apollo Twin Software

Apollo Twins are supplied with a software application, the Console, and a utility, the UAD Meter and Control Panel. Both software pieces are accessible from the dock once installation is complete. Software installation is simple and



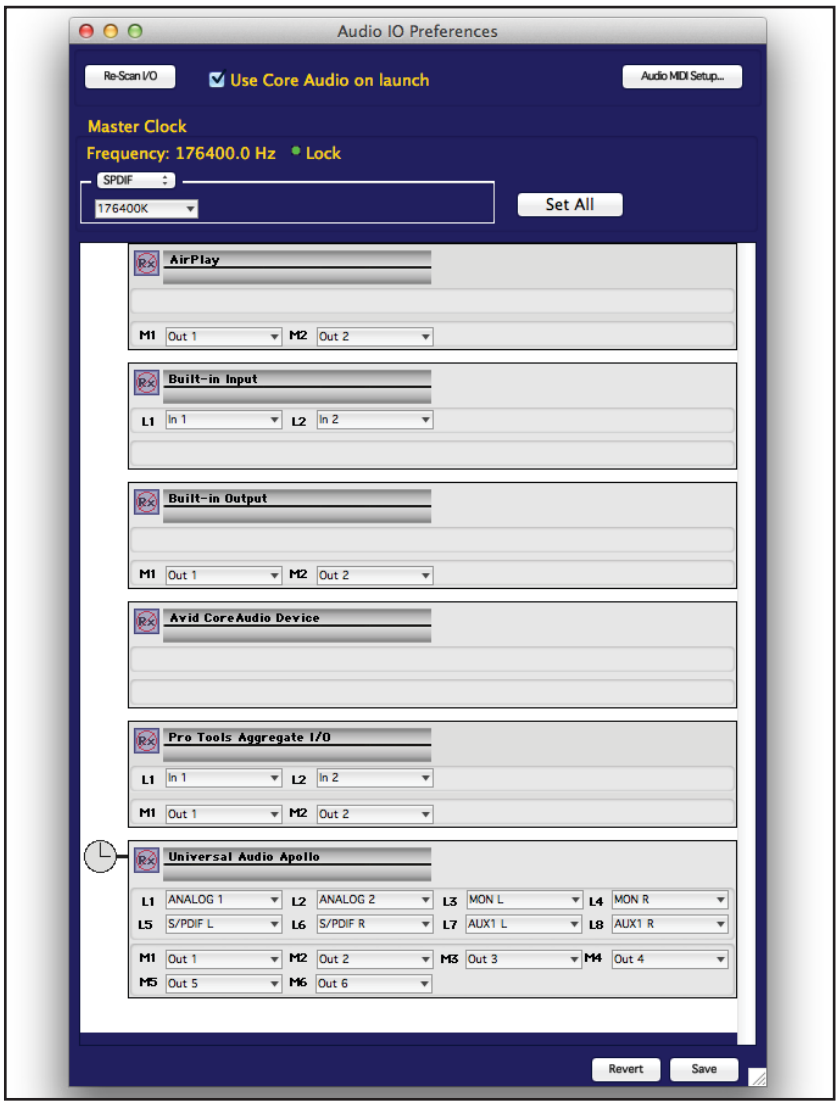
The Universal Audio Apollo Twin provides easy-to-use Preamp and Monitor buttons as well as six Preamp Option buttons that enables users to choose Input Select, Low-Cut Filter, 48 V, Pad, Polarity, and Link.



Apollo Twin offers two microphone inputs and two analog line inputs, one Hi-Z instrument input, two analog line outputs (independent mix buses) and two analog monitor outputs, headphone output, TOSLINK optical (ADAT or S/PDIF, selectable) and one Thunderbolt port (Thunderbolt 2). It also has a bayonet-style locking connector to prevent accidental disconnection of the included wall wart power supply.

Apollo Twin includes a real-time Analog Classics Bundle that contains UAD Powered Plug-Ins to track and mix analog emulations, including guitar and bass amp emulations from Softube, as well as Universal Audio's 610 Tube Preamp and EQ plug-in.

A valuable feature of the Apollo Twin family is its ability to add separate processing to foldback while printing a take dry and with effects.



Apollo Twin provides several I/O options, plus plug-ins linking to your DAW environment.

straightforward. The modal Control Panel monitors hardware resources, visually confirms that the UAD system is properly operating, and enables users to configure the global UAD Powered Plug-ins system parameters.

The Console is the main software interface for Apollo hardware. It is used to remotely control the hardware's mixing and monitoring functions, including the sample rate, the clock source, and the reference levels. Console replaces the DAW's software monitoring feature. The Apollo hardware's extremely low latency, less than 2 ms, in conjunction with its ability to provide reverb and EQ to the headphone mix, makes for comfortable foldback. The Console's analog-style mixer enables real-time, DSP–accelerated processing using UAD Powered Plug-Ins to be configured and operated. UAD Powered Plug-Ins can be inserted into all Console inputs and/or auxiliary returns while monitoring and/or tracking. All processed or unprocessed mix buses, including the monitor, the auxiliary, the headphone, and the cue buses can be optionally routed to a DAW for recording.

Console can be simultaneously used with a DAW for front-end processing and monitoring functionality. Complete setups can be saved as presets for easy recall of the entire configuration. A Console Recall plug-in, in the previously mentioned four formats, is included to conveniently store Console configurations within DAW project files. Console has two pre/post stereo auxiliary buses, with independent send levels per input, for grouped signal processing, which conserves DSP resources. It can also be used when routing to alternate hardware outputs. Using Console, the headphone mix bus can be mirrored to any hardware output. The straightforward layout and clear labeling makes it easy to use.

The Apollo family includes permanent licenses for the Real-time Analog Classics package, which consist of a UA 610-B tube Preamp & EQ, the Softube Amplifier Room Essentials, the 1176SE/LN Classic Limiting Amplifiers (Legacy version), the Pultec Pro Equalizers (Legacy version), the Teletronix LA-2A Classic Leveling Amplifier (Legacy version), the CS-1

About the Author

Oliver. A. Masciarotte is a graduate of the Lowell Institute of MIT. Oliver has been a principal of Seneschal, a consultancy to the professional audio and rich media industries, for more than 25 years. Oliver is also the author of more than 100 trade articles and he wrote *To Serve & Groove*, a book about file-based music playback for the home.

No Limits for Thunderbolt

Making its debut at the 2009 Intel Developer Forum alongside the release of the Nehalem microarchitecture and Core i5, the then-new "Light Peak" technology was demonstrated to me on prototype "mad scientist" hardware. At the time, the engineering team was able to run parallel 1080p streams plus Ethernet and storage protocols over a 30-m glass fiber. That technology was later rebranded as Thunderbolt and, to reduce costs during commercialization, an electrical copper PHY was adopted. Today's Thunderbolt offers 10-Gbps bidirectional throughput on separate data and display channels, enabling you to move 1 TB of data in less than 5 mins. Up to six devices can be daisy chained.

Ready for "4K" UHDTV video, the next generation Thunderbolt 2 runs at 20 Gbps. With DisplayPort 1.2 support, Thunderbolt 2 enables video streaming to a 4K monitor. Thunderbolt's advantages are legion—an ultra-high speed throughput, support for copper and fiber, plus backward compatibility with PCI Express, DisplayPort, FireWire, HDMI, DVI, and Gigabit Ethernet.

Old School FireWire reliably extends only 3 m. In 2013, Thunderbolt went back to its roots with several vendors introducing optical cables. Corning, which is best known for its Gorilla Glass, manufactures 5.5-, 10-, and 30-m Thunderbolt Optical Cables by Corning. Corning has also announced a new 60-m length. These widely available interconnects, ready for Thunderbolt 2, employ active circuitry in the connectors to transform electrical signaling to modulated light and back again. Very lightweight, thin, tough, and highly pliable optical cables are perfect for moving bulky data around a facility. Because the multi-mode glass fiber is optimized for the specific application, jitter and signal integrity are not issues, even over relatively long distances.

In addition to Corning's generous contribution to this review, the folks at Belkin supplied a Thunderbolt Express Dock, their answer to every modern Mac-equipped studio's dreams. This slim aluminum sled sports a Thunderbolt connection to your computer, another Thunderbolt port to daisy chain up to five additional devices, a Gigabit Ethernet port, a FireWire 800 port, a 3.5-mm headphone jack, a 3.5-mm analog audio input jack, and three powered (500 mA) USB 3.0 ports. It also includes a 40" Thunderbolt cable. In short, every possible spigot you could require, located next to the host or remotely via a Thunderbolt Optical Cable by Corning.

Thunderbolt Optical Cable by Corning is now available in a 60-m length.

Precision Channel, and the RealVerb Pro.

Each input and auxiliary return can have four plug-in instances. The only constraint is that the signal flow is always serial. The insert processing can be monitored "wet," while the recording can be wet or dry. Sub-2 ms round-trip latency through four serial non-upsampled UAD plug-ins at 88.2 kHz means foldback with effects and real-time performance are not a problem.

When asked about DSP expansion, Kashiwa mentioned that, "...you can add PCIe cards via a Thunderbolt PCIe chassis, an existing FireWire Satellite via the Apple Thunderbolt–to–FireWire Adapter or... one of the latest UAD-2 Satellite Thunderbolt external units. (Note: This was announced while the review was in the works—see "New UAD-2 Satellite Thunderbolt DSP Accelerators" sidebar.) Any of those options give you more DSP for mixing (in your DAW). These DSPs are not used for real-time processing. It's possible to have four UAD devices in a single system so, for example, you could max it out at three OCTOs and a Twin for a total of 26 DSP chips," which is a lot of DSP horsepower.

As the Apollo family is meant to be an entry level piece, they are not very expandable when it comes to I/O. Kashiwa suggests that, "you can add up to eight (I/O channels) with ADAT, and that's about it. One cool combo we like is the UA 4-780d, a four-channel 'Tone-Blending' mic preamp with dynamics, in combination with the Twin. (That combination provides)...some great tube front end and four additional line inputs that get converted and passed through."

Apollo Twin Components

Conversion components and clocking are what makes a converter sound the way it does.

New UAD-2 Satellite Thunderbolt DSP Accelerators

By João Martins

At some point, the market believed external DSP accelerators would be surpassed by native (multiple-core) central processing unit (CPU) resources on PC and Mac workstations. This is why most manufacturers decided to discontinue that strategy. Universal Audio was the only company that remained in this domain and proved how audio recording hardware and software could continue to exponentially be improved by add-on DSP resources due to the evolution in faster communication interfaces (e.g., Intel and Apple's Thunderbolt technology).

Recently, Universal Audio announced a new line of UAD-2 Satellite Thunderbolt DSP Accelerators as a sleek, powerful way for Thunderbolt-equipped Mac users to "supercharge" their systems and run larger mixes filled with rich, DSP-intensive plug-ins. DSP accelerators combined with newly optimized ultra-low-latency plug-ins is proving to be the future of studio outboard with all the flexibility and convenience of software integration.

The new desktop-friendly fan-free units provide full access to UAD Powered Plug-Ins, including exclusive plug-in emulations from Studer, Ampex, Lexicon, Neve, Manley, SSL, Roland, EMT, Empirical Labs, MXR, and more. Available in QUAD or OCTO models with a choice of four or eight SHARC processors, UAD-2 Satellite Thunderbolt DSP Accelerators can also be integrated alongside UAD-2 PCIe cards and Thunderbolt-enabled Apollo interfaces, including Apollo Twin, Apollo, and Apollo 16—for truly scalable mixing power.

Universal Audio's new line of UAD-2 Satellite Thunderbolt DSP Accelerators shipped in early October.

The new UAD-2 Satellite Thunderbolt's key features include support for UAD Powered Plug-Ins via Thunderbolt or a Thunderbolt 2 connection on Macs for improved performance at higher sample rates, and reduced plug-in latency vs. FireWire, with 8 (OCTO) SHARC processors providing a massive DSP boost for running large professional mixes.

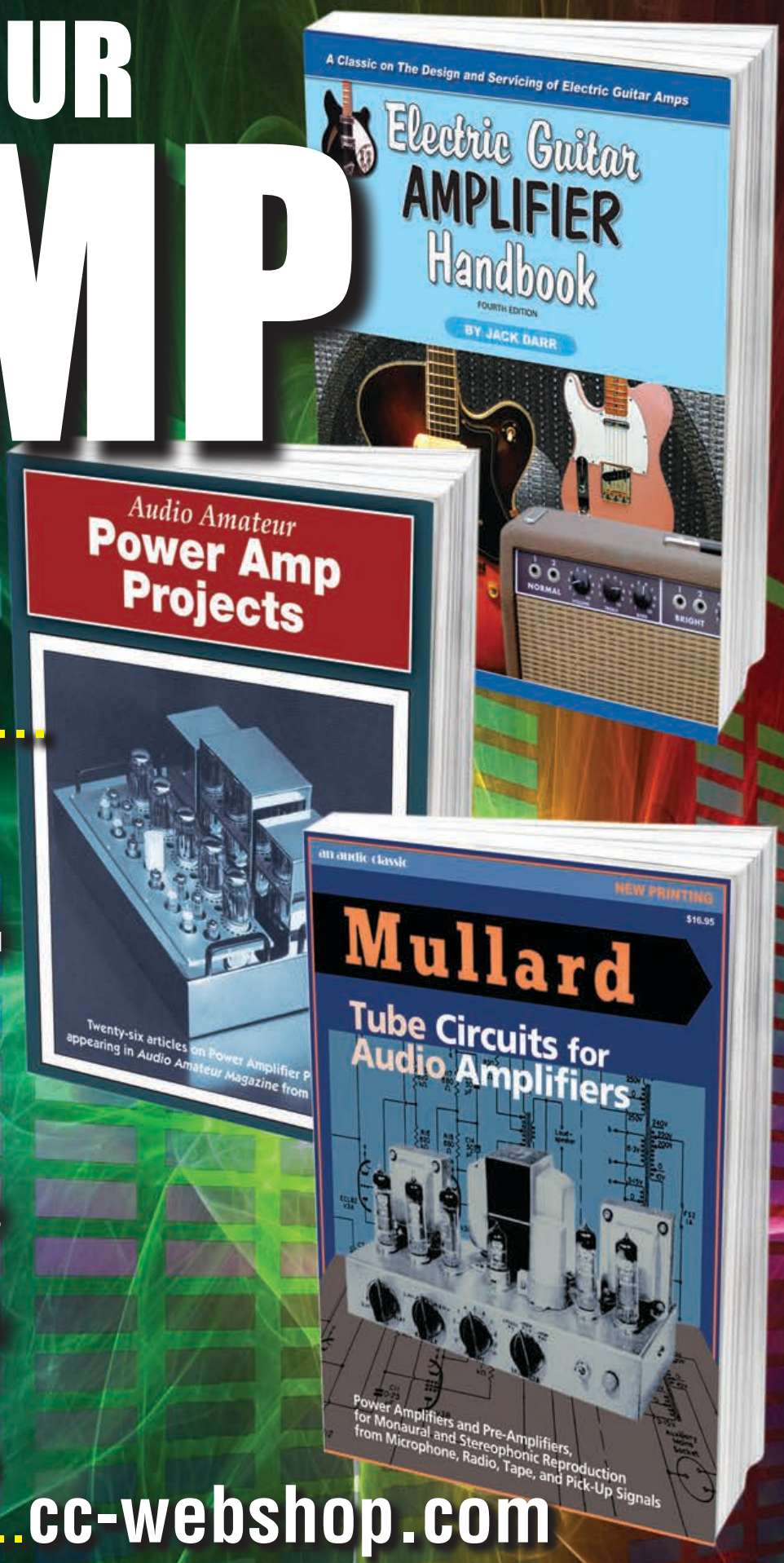
Universal Audio
www.uaudio.com

What's YOUR AMP

Design it...

Build it...

Fix it...



Electric Guitar Amplifier Handbook

Everything you need to know about how each part of the amp works and what to do when it doesn't.

Power Amp Projects

An array of designs for those who prefer to build their own audio equipment.

Mullard Tube Circuits for Audio Amplifiers

A complete guide to building 11 power and control amps for a sound system with vacuum tubes.

Resources for the audio enthusiast...cc-webshop.com

Adam Tucker at Signaturetone Recording (a) emphasized the simplicity of the Apollo Twin's setup and routing (b). The combination of small form factor and Corning's optical Thunderbolt connectivity make for easy, optimal placement.

Apollo Twin uses the "premium," differential input monolithic AKM AK5388EQ for analog-to-digital conversion. Asahi Kasei Microdevices specifies the part as having a short group delay, with an anti–aliasing filter that "…features a modified FIR architecture (that) minimizes group delay while maintaining excellent linear phase response." Group delay produces frequency–dependent delay or what the unwashed masses think of as "time smear."

Finite impulse response (FIR) filters are an architecture not easily implemented in the analog world. Unlike active analog EQ, where an RC or frequency selective network is placed in the feedback loop of a differential amplifier, a FIR filter is a feedforward design. No feedback means no ringing, a fast settling time, and a linear phase response.

As to clocking, the engineers at Universal Audio wouldn't reveal too much about their solution but they did allude to their use of JetPLL. According to TC Applied Technologies, JetPLL is a patented solution for audio band jitter attenuation, with a hybrid design that incorporates noise shaping to "virtually remove audio band jitter."

Digital-to-analog conversion on the monitor and line outs are performed by Cirrus Logic's "flagship" CS4398. According to Cirrus, this part includes "half dB step-size volume control…(and) selectable fast and slow roll off digital interpolation filters followed by an oversampled multibit Delta-Sigma modulator, which includes mismatch shaping technology that eliminates distortion due to capacitor mismatch. Following this stage is a multi-element switched capacitor stage and low-pass filter with differential analog outputs."

It's a pity Universal Audio didn't provide software control for the anti-imaging filter topologies.

For the headphone output, Universal Audio chose the quotidian, differential output AKM AK4480EF. Though the Twin's headphone out is no match for more costly converters, it provides good quality playback right where it's needed most, and helps keep the total cost down.

In Use

The Apollo Twin is one of those solidly built boxes that reliably does what you expect, without the annoying implementation and plethora of questionable features found in many MI offerings. The sound quality is excellent for the price, and the UAD Powered Plug-Ins are peerless. It seems like a trivial thing, but all the engineers who logged some time with the box appreciated the monitor mute switch built into the Big Knob. Another small but significant feature is the power connector. The

included wall wart power supply has a bayonet-style locking connector to prevent accidental disconnection. When asked to weigh in on the design of the power supply unit (PSU), Gannon Kashiwa opined that an external power supply was "absolutely" required due to space considerations. "The inside of Apollo Twin is packed and heat is a huge consideration. The DC power from the external supply is conditioned inside the box and gets regulated and cleaned to provide a stable, noise-free source."

Another aspect of the Apollo Twin that met with approval was the product's uncomplicated nature. Engineers Adam Tucker at Signaturetone Recording and August Ogren at Humans Win! appreciated the simplicity of the setup and the routing, which enabled everyone to obtain excellent sounds and quickly move forward with the recording sessions. With another nod to the design team's expertise, the preamps overload surprisingly gracefully, bringing fatness rather than harshness to more energetic musical moments. In all, an outstanding entry level interface, with a deep, innovative Thunderbolt implementation, and excellent tracking and mixing capabilities.

After spending a good bit of time with the product, only one flaw came to light. Although the Plug-ins tab in the supplied UAD Control Panel indicates which plug-ins are currently licensed and available for use, the Console's plug-in selection menu doesn't. Also, that the Console's plug-in menu does not allow grouping of available plug-ins by type, making it painful to select a particular class of effect or virtual gear. Universal Audio is aware of these shortcomings and, hopefully, will address them in a future software release.

Sources

AKM AK5388EQ and AKM AK4480EF ADCs
Asahi Kasei Microdevices, Corp. | www.akm.com

Thunderbolt optical cables
Corning, Inc. | www.corning.com

CS4398 Stereo DAC
Cirrus Logic Inc. | www.cirrus.com

Apollo Twin
Universal Audio | www.uaudio.com